Royal Netherlands
Meteorological Institute
Ministry of Transport,
Public Works and Water Management

Ozone Profiles from the Ozone Monitoring Instrument (OMI) - First Validation and Initial Science

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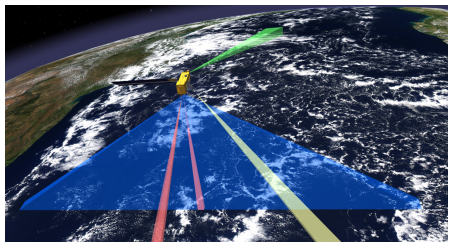

We present first results of validation and science of the operational vertical ozone profiles retrieved from nadir observations by the Ozone Monitoring Instrument (EOS-Aura OMI). Advantageous are the high spatial resolution (≥13x48 km^2) and daily global coverage with a fair vertical resolution (≥6-7 km). Validation is performed against MLS, SAGE-II, HALOE, GOMOS, OSIRIS and ECC sondes. Illustratively the 2006 Southern Hemisphere ozone hole is scientifically explored.

1. Nadir Ozone Profile

Optimal estimation; the amount of ozone in each of the atmospheric layers is adjusted to match the modeled and measured sun-normalized radiance. [18 layers, UV1 (270–308.5 nm), UV2 (311.5–330 nm), adjusted McPeters-Logan-Labow, Rotational Raman, OMO3PR, NASA, http://disc.gsfc.nasa.gov].

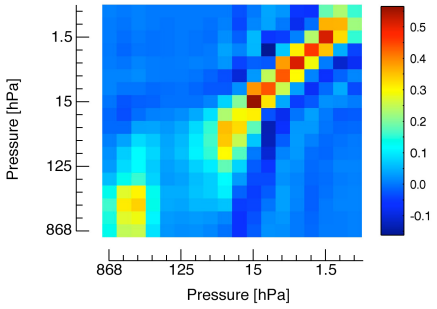

Fig.1: Typical example of the (nadir) vertical ozone profile averaging kernel. DOF=6-7.

2. Validation

2.1 MLS

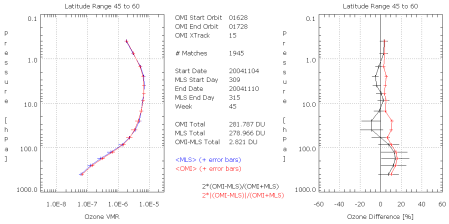

Fig.2: Average and difference of one week of OMI and MLS ozone profiles in the northern mid-latitudes [45N-60N].

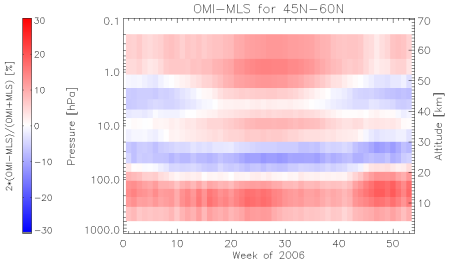

Fig.3: Average OMI and MLS ozone profile differences per week for the year 2006 in the northern mid-latitudes [45N-60N].

2.2 SAGE-II and HALOE

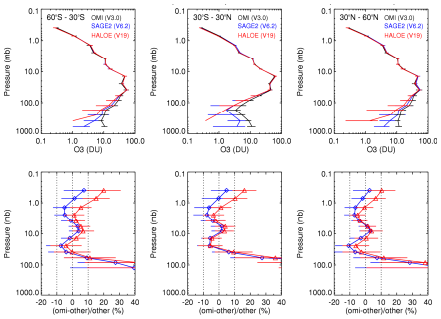

Fig.4: Zonal statistics of OMI vs. SAGE-II and HALOE (0.5° and 12^h collocation).

2.3 ECC Sondes

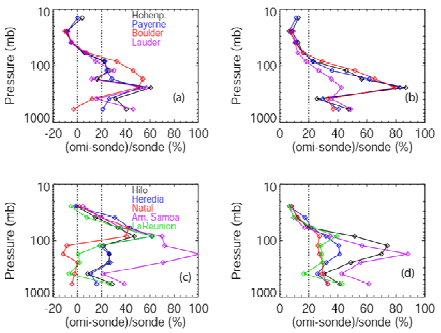

Fig.5: Median difference (a) and statistical spread (b) between OMI and ozone sondes at various mid latitude and tropical stations.

2.4 GOMOS and OSIRIS

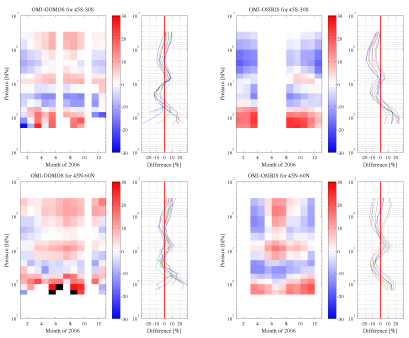

Fig.6: Median difference calculated monthly for the year 2006 for OMI-GOMOS (lhs) and OMI-OSIRIS (rhs) for two selected latitude bins plotted as timeline and profiles.

3. 2006 SH Ozone Hole

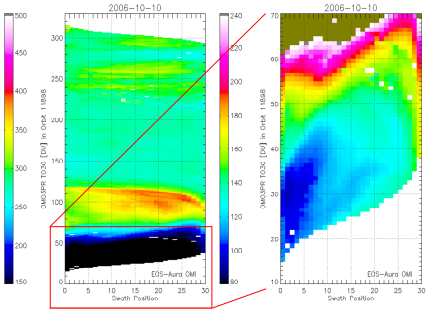

Fig.7: Flatbed plots of total ozone column (TOC) for orbit 11898. RHS zoom-in box.

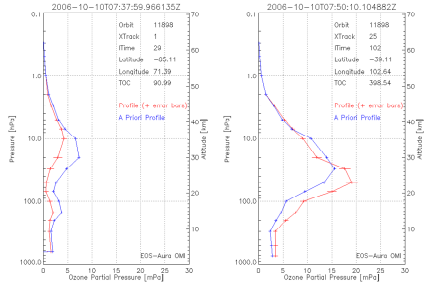

*Fig.8: The ozone profile inside the polar vortex (VMR*p=PaP) for min/max TOC.*

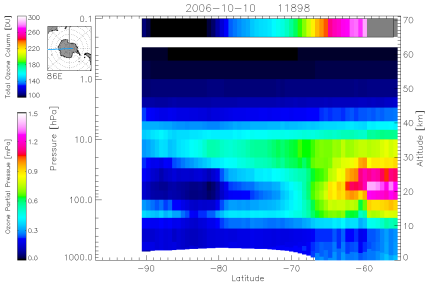

Fig.9: Curtain plot of the ozone profile in partial pressure for xtrack=2 on 2006-10-10.

4. Conclusions

OMI operational nadir ozone profiles (OMO3PR) provide an accurate daily 3D view on the global ozone layer. The intricate details of the formation, evolution and fate of the Antarctic ozone hole can now be monitored at high spatiotemporal resolution over the entire Antarctic polar region.

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